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This document is part of a software package that provides the capability to conformance test the Department of Defense suite of upper level protocols including: Internet Protocol (IP) Mil-Std 1777, Transmission Control Protocol (TCP) Mil-Std 1778, File Transfer Protocol (FTP) Mil-Std 1780, Simple Mail Transfer Protocol (SMTP) Mil-Std 1781 and TELNET Protocol Mil-Std 1782.

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# DEFENSE COMMUNICATIONS AGENCY

## UPPER LEVEL PROTOCOL TEST SYSTEM

### SIMPLE MAIL TRANSFER PROTOCOL MIL-STD 1781 TEST TRACEABILITY INDEX

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SIMPLE MAIL TRANSFER PROTOCOL (SMTP)

MIL-STD-1781

TRACEABILITY MATRIX

→ This Traceability Matrix provides information on the derivation, organization, and function of tests specified for SMTP within the protocol test system.

This document is divided into four sections:

SMTP TRACEABILITY INDEX;  
SMTP TEST INDEX;  
SMTP TEST SCENARIOS INDEX;  
SMTP SCENARIOS AND TEST DESCRIPTIONS.

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**SMTP TRACEABILITY INDEX: SMTP TEST NUMBERS VERSUS SMTP MIL-STD-1781 . . .**

The table indicates the cross-reference between the Test Scenarios and the applicable section in MIL-STD-1781 regarding each required function, operation, option, mode, response, or state.

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**SMTP TEST INDEX: SMTP "PRINCIPLE TESTS" . . .**

The table shows the SMTP Test Numbers that may be regarded as the "principle test" for each requirement of the SMTP.

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**SMTP TEST SCENARIOS INDEX: SMTP TEST SCENARIO FILES VERSUS SMTP TEST NUMBERS . . .**

The table shows, for each SMTP Test Number, the UNIX file names of the SMTP Test Scenario Files in which that number appears.

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## SMTP SCENARIOS AND TESTS DESCRIPTIONS . . .

This section provides a brief narrative of the scope and objectives of each SMTP Test Scenario File and an operational description of each SMTP Test Number.

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### SECTION 1 - SMTP TRACEABILITY INDEX

#### Sender SMTP

The following table indicates which sections of MIL-STD-1781 are addressed by each Sender SMTP test.

#### MIL-STD-1781 Reference

#### Test Numbers

##### SMTP Specifications

6.1.1.1	HELO command	1, all
6.1.1.2	MAIL command	1
6.1.1.3	RCPT command	1
6.1.1.4	DATA command	all
6.1.1.5	SEND command	4
6.1.1.6	SOML command	2
6.1.1.7	SAML command	3
6.1.1.13	QUIT command	all
6.1.2	Restrictions on command order	all
6.1.3	Command syntax	6, all
6.2.2	Numeric order list of reply codes	
6.2.2.c	Reply code 220	all
6.2.2.d	Reply code 221	6, 7
6.2.2.e	Reply code 250	all
6.2.2.g	Reply code 354	all
6.3	Sequencing of commands and replies	7, all
6.5.1	Minimum implementation	1
6.5.2.1	ASCII characters	5
6.5.3	Sizes	
6.5.3.e	Reply Line	8

##### SMTP Procedures

5.2	Mail	1
5.5	Sending and mailing	1, 2, 3, 4
5.6	Opening and closing	all

**Receiver SMTP**

The following table indicates which sections of MIL-STD-1781 are addressed by each Receiver SMTP test.

**MIL-STD-1781 Reference****Test Numbers****SMTP Specifications**

6.1.1.1	HELO command	1, 2, all
6.1.1.2	MAIL command	3
6.1.1.3	RCPT command	3, 20, 21, 22, 41, 43
6.1.1.4	DATA command	all
6.1.1.5	SEND command	27, 28
6.1.1.6	SOML command	29
6.1.1.7	SAML command	30
6.1.1.8	RSET command	23, 24, 25, 26
6.1.1.9	VRFY command	33, 36
6.1.1.10	EXPN command	34, 37
6.1.1.11	HELP command	35, 38
6.1.1.12	NOOP command	10, 11
6.1.1.13	QUIT command	1, all
6.1.1.14	TURN command	32
6.1.2	Restrictions on command order	16, all
6.1.3	Command syntax	18, all
6.1.3.2	SMTP syntax	40
6.1.3.3	Timestamp and return path lines	4, 5, 7
6.2.2	Numeric order list of reply codes	
6.2.2.a	Reply code 211	35, 38
6.2.2.b	Reply code 214	35, 38
6.2.2.c	Reply code 220	all
6.2.2.d	Reply code 221	all
6.2.2.e	Reply code 250	all
6.2.2.f	Reply code 251	all
6.2.2.g	Reply code 354	all
6.2.2.h	Reply code 421	all
6.2.2.i	Reply code 450	all
6.2.2.j	Reply code 451	all
6.2.2.k	Reply code 452	all

MIL-STD-1781 ReferenceTest NumbersSMTP Specifications (cont'd)

6.2.2.1	Reply code 500	all
6.2.2.m	Reply code 501	all
6.2.2.n	Reply code 502	3, 25, 26, 32, 33, 34, 35, 36, 37, 38
6.2.2.o	Reply code 503	all except 2
6.2.2.p	Reply code 504	all
6.2.2.q	Reply code 550	all except 2
6.2.2.r	Reply code 551	all except 2
6.2.2.s	Reply code 552	all
6.2.2.t	Reply code 553	all except 2
6.2.2.u	Reply code 554	all except 2
6.3	Sequencing of commands and replies	16, all
6.5.1	Minimum implementation	1, 2, 3, 10, 11, 41
6.5.2	Transparency	8
6.5.2.1	ASCII characters	9
6.5.3	Sizes	
6.5.3.d	Command Line	13
6.5.3.f	Reply Line	14

SMTP Procedures

5.2	Mail	2, 3
5.3	Forwarding	20, 21, 22, 41, 43
5.4	Verifying and expanding	33, 34, 36, 37
5.5	Sending and mailing	2, 3, 27, 28, 29, 30, 25, 26, 42
5.6	Opening and closing	all
5.7	Relaying	20, 21, 22, 41, 43
5.8	Domains	40
5.9	Changing roles	32

SECTION 2 - SMTP TEST INDEXSender SMTP

The following table indicates which Sender SMTP tests are to be regarded as the "principal tests" of the listed SMTP capabilities.

<u>Test Number</u>	<u>Purpose</u>
1	Basic mail transaction command sequence (HELO, MAIL, RCPT, DATA, QUIT)
2	Transmission of SOML command
3	Transmission of SAML command
4	Transmission of SEND command
5	Transmission of all printable ASCII characters
6	Response to incorrect command reply syntax
7	Response to incorrect command reply code
8	Response to excessively long command reply



**Receiver SMTP**

The following table indicates which Receiver SMTP tests are to be regarded as the "principal tests" of the listed SMTP capabilities.

<b><u>Test Number</u></b>	<b><u>Purpose</u></b>
1	Response to HELO-QUIT sequence
2	Response to multiple HELO commands
3	Basic mail transaction command sequence (HELO, MAIL, RCPT, DATA, QUIT)
4	Ability to prefix reverse path to message
5	Ability to prefix null reverse path to message
6	Notification of Undeliverable Mail
7	Ability to prepend timestamp to mail message
8	Response to data transparency sequence
9	Ability to process all printable ASCII characters
10	Response to NOOP command outside a transaction
11	Response to NOOP command during a transaction
13	Response to excessively long command line
14	Response to excessively long text line
16	Response to invalid command sequence
17	Response to nonexistent command
18	Response to incorrect command syntax
20	Ability to relay message
21	Ability to relay multiple messages to multiple recipients
22	Response to MAIL requiring relay to nonexistent recipient
23	Response to RSET command during a transaction
24	Response to RSET command following RCPT
25	Response to RSET command following SAML
26	Response to RSET command following SOML
27	Response to SEND command
28	Response to SEND to nonexistent recipient
29	Response to SOML command
30	Response to SAML command
32	Response to TURN command and ability to fulfill basic Sender SMTP role

<u>Test Number</u>	<u>Purpose</u>
33	Response to VRFY command outside a transaction
35	Response to EXPN command outside a transaction
37	Response to HELP command outside a transaction
34	Response to VRFY command during a transaction
36	Response to EXPN command during a transaction
38	Response to HELP command during a transaction
40	Response to various hostname formats
41	Response to multiple RCPT commands
42	Ability to process multiple, simultaneous mail transactions
43	Ability to relay message through multiple hosts

SECTION 3 - SMTP TEST SCENARIO INDEXSender SMTP

The following table indicates which tests are contained within each Sender SMTP test scenario file.

<u>Test Number</u>	<u>Scenario Name</u>
1	BASIC
2	SOML
3	SAML
4	SEND
5	ASCII
6	BAD_SYNTAX
7	BAD_REPLY
8	LONG_LINE

**Receiver SMTP**

The following table indicates which tests are contained within each Receiver SMTP test scenario file.

<b><u>Test Number</u></b>	<b><u>Scenario Name</u></b>
1	BASIC
2	MULTI_HELO
3	TRANSACTIONS
4	
5	
6	
7	
8	
9	
10	
11	
13	LIMITS
14	
16	NEG
17	
18	
20	RELAY
21	
22	
23	RSET
24	RSET_RCPT
25	RSET_SAML
26	RSET_SOML
27	SEND
28	
29	
30	

<u>Test Number</u>	<u>Scenario Name</u>
32	TURN
33	OPTIONS
34	
35	
36	
37	
38	
40	HOSTNAMES
41	MULTI_RCPT
42	MULTI_SMTP
43	RELAY3

## SECTION 4 - SMTP SCENARIO AND TEST DESCRIPTIONS

### Sender SMTP

This section summarizes the scope and objectives of each Sender SMTP test scenario and describes the operational characteristics of each test within each scenario.

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### Scenario BASIC

Scenario **BASIC** tests the Sender-SMTP IUT for basic mail transmission capability. If the IUT does not produce good results on the first run of this test scenario, then further testing should be abandoned until the problems are corrected. The scenario expects the IUT to transmit a correct HELO-MAIL-RCPT-DATA-QUIT command sequence.

### TEST 1: BASIC MAIL TRANSACTION

Does the Sender-SMTP IUT correctly format and transmit a mail message?

**ACTION:** The Central Driver (CD) commands the Remote Driver (RD) to place a mail message with a unique id number on the IUT mail queue. The Sender-SMTP IUT should find the message in the queue and start a mail transaction. The mail message is sent to the Reference Receiver-SMTP. The Reference places the message on the Lab mail queue. The Laboratory Driver (LD) passes the mail message, including the id number, to the CD in a TSL data packet.

**VERIFICATION:** The CD searches for the correct command sequences and the correct message id number.

**SUCCESS:** The correct command sequences and message id are found.

**FAILURE:** Any of the following indicates an IUT failure:

- Connection not made;
- Command sequences are incorrect;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

=====

Scenario SOML

Scenario **SOML** tests the Sender-SMTP IUT's capability to conduct a basic SMTP transaction involving transmission of the SOML command.

TEST 2: SOML COMMAND DURING A TRANSACTION

Does the Sender-SMTP IUT correctly transmit the SOML command?

**ACTION:** The CD establishes a connection with the RD. The CD commands the RD to queue a mail message with a known identification number. The IUT should find the message in the queue and send or mail the message to the laboratory destination terminal screen or mailbox. The destination is the **test** mailbox or terminal. If the message does not get placed onto the laboratory mail queue, then the lab tester must verify the correct receipt of the message by manually checking the destination terminal screen.

**VERIFICATION:** The CD searches for the correct message identification number in the laboratory mail queue. If the message was not placed onto the mail queue, then manual verification of correct message receipt at destination terminal is performed by lab tester. Also, no mail message should have been placed onto the mail queue if the message was displayed at the destination terminal.

**SUCCESS:** The CD finds the correct message identification number in the mail queue and no message appears at the destination terminal or the message appears at the destination terminal and no message is found in the mail queue.

**FAILURE:** Any of the following indicates an IUT failure:

- Message does not appear in either the destination mail queue or at the destination terminal, or appears at both;
- Connection not made;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

=====

### Scenario SAML

Scenario **SAML** tests the Sender-SMTP IUT's capability to conduct a basic SMTP transaction involving transmission of the SAML command.

#### TEST 3: SAML COMMAND DURING A TRANSACTION

Does the Sender-SMTP IUT correctly transmit the SAML command?

**ACTION:** The CD establishes a connection with the RD. The CD commands the RD to queue a mail message with a known identification number. The IUT should find the message in the queue and send and mail the message to the laboratory destination terminal screen and mailbox. The destination is the test mailbox or terminal. The lab tester must verify the correct receipt of the message by manually checking the destination terminal screen.

**VERIFICATION:** The CD searches for the correct message identification number in the laboratory mail queue. Manual verification of the correct message receipt at the destination terminal is performed by the lab tester. The mail message should have been placed onto the mail queue and the message displayed at the destination terminal.

**SUCCESS:** The CD finds the correct message identification number in the mail queue and the correct message appears at the destination terminal.

**FAILURE:** Any of the following indicates an IUT failure:

- Message does not appear in either the destination mail queue or at the destination terminal, or appears at one but not the other;
- Connection not made;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

=====

### Scenario SEND

Scenario **SEND** tests the Sender-SMTP IUT's capability to conduct a basic SMTP transaction involving transmission of the SEND command.



**TEST 4: SEND COMMAND DURING A TRANSACTION**

Does the Sender-SMTP IUT correctly transmit the SEND command?

**ACTION:** The CD establishes a connection with the RD. The CD commands the RD to queue a mail message with a known identification number. The IUT should find the message in the queue and send the message to the laboratory destination terminal screen. The destination is the **test** terminal. The lab tester must verify the correct receipt of the message by manually checking the destination terminal screen.

**VERIFICATION:** Manual verification of the correct message receipt at the destination terminal is performed by the lab tester. No mail messages should have been placed onto the mail queue. The CD searches for the correct message identification number in the laboratory mail queue. If the message was placed onto the mail queue, then the IUT fails.

**SUCCESS:** The CD does not find the correct message identification number in the mail queue and the correct message appears at the destination terminal.

**FAILURE:** Any of the following indicates an IUT failure:

- Message does not appear at the destination terminal, or appears in destination mail queue;
- Connection not made;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

=====

**Scenario ASCII**

Scenario **ASCII** tests the Sender-SMTP IUT's capability to send all the printable ASCII characters as mail data.

**TEST 5: ASCII DATA**

Does the IUT correctly transmit all the printable ASCII characters as mail data?

**ACTION:** The CD establishes a connection with the IUT. The CD commands the RD to place a mail message containing all the printable ASCII characters and a known

identification string onto the IUT mail queue. The IUT should mail the message to the Reference Receiver-SMTP.

VERIFICATION: The CD searches for the correct commands and the correct mail data in the mail message.

SUCCESS: The CD receives the correct commands and the correct ASCII characters and identification string in the mail message.

FAILURE: Any of the following indicates an IUT failure:

- Connection not made;
- Incorrect commands received;
- Not all ASCII characters received;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

=====

#### Scenario BAD SYNTAX

Scenario **BAD\_SYNTAX** tests the Sender-SMTP IUT's capability to correctly process reply codes with incorrect syntax.

#### TEST 6: REPLY CODES WITH INCORRECT SYNTAX

Does the IUT correctly process reply codes with incorrect syntax?

ACTION: The CD establishes a connection with the IUT. The CD commands the RD to place a mail message with a known identification number onto the IUT mail queue. The CD then commands the Reference to listen for a connection attempt from the IUT. The CD replies correctly to the open request and the HELO, MAIL, and RCPT commands, but replies incorrectly to the DATA command. The IUT should reset the connection with the RSET command and then attempt to complete the transaction.

VERIFICATION: The CD searches for the correct command sequences.

SUCCESS: The CD receives the RSET command after sending an incorrect reply code.

FAILURE: Any of the following indicates an IUT failure:

- Connection not made;
- Incorrect command received;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

=====

Scenario BAD REPLY

Scenario **BAD\_REPLY** tests the Sender-SMTP IUT's capability to correctly process an incorrect command reply from the peer Receiver-SMTP.

TEST 7: INCORRECT RECEIVER REPLIES

Does the IUT correctly process incorrect command replies from the peer Receiver-SMTP?

ACTION: The CD establishes a connection with the IUT. The CD commands the RD to place a mail message with a known message identification number onto the IUT mail queue. The CD commands the Reference Receiver-SMTP to listen for a connection attempt from the IUT. The Sender SMTP IUT should find the message in the queue and initiate a mail transaction with the Reference Receiver-SMTP. The Reference Receiver-SMTP replies correctly to the connection opening and the HELO, MAIL, and RCPT commands, but replies incorrectly to the DATA command. The IUT should attempt to reset the connection with the RSET command and then complete the mail transaction.

VERIFICATION: The CD searches for the correct commands and the correct message id number.

SUCCESS: The CD receives the correct commands and the correct message id number.

FAILURE: Any of the following indicates an IUT failure:

- Connection not made;
- Incorrect commands received;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

=====

Scenario LONG LINE

Scenario **LONG\_LINE** tests the Sender-SMTP IUT's capability to correctly process an excessively long reply line.

TEST 8: EXCESSIVELY LONG REPLY LINE

Does the IUT correctly process reply lines exceeding the allowed 512 bytes?

**ACTION:** The CD establishes a connection with the IUT. The CD commands the RD to place a message with a known message identification number onto the IUT mail queue. The CD commands the Reference Receiver-SMTP to listen for a connection attempt from the IUT. The Sender-SMTP IUT should find the message in the queue and initiate a mail transaction with the Reference Receiver-SMTP. The Reference Receiver-SMTP replies correctly to the connection opening and the HELO command, but replies incorrectly to the MAIL command. The IUT should attempt to reset the connection with the RSET command and then complete the mail transaction.

**VERIFICATION:** The CD searches for the correct commands and the correct message id number.

**SUCCESS:** The CD receives the correct commands and the correct message id number.

**FAILURE:** Any of the following indicates an IUT failure:

- Connection not made;
- Incorrect commands received;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

## Receiver SMTP

This section summarizes the scope and objectives of each Receiver SMTP test scenario and describes the operational characteristics of each test within each scenario.

### Scenario BASIC

Scenario **BASIC** tests the Receiver-SMTP IUT's ability to correctly process a sequence of commands, HELO and QUIT, that establishes an SMTP connection and then closes it without initiating a mail transaction. If the IUT does not produce good results on the first run of this test scenario, further testing should be abandoned until the problems are corrected.

#### TEST 1: HELO-QUIT SEQUENCE

Does the IUT correctly process the HELO-QUIT command sequence.

**ACTION:** The CD establishes a connection with the IUT. The HELO command is issued, immediately followed by the QUIT command.

**VERIFICATION:** The CD searches for the correct command replies.

**SUCCESS:** The CD receives command replies of 250.

**FAILURE:** Any of the following indicates an IUT failure:

- Connection not made;
- Command replies of 500, 421;
- Command reply other than those listed above;
- RD does not correctly perform CD commands;

### Scenario MULTI HELO

Scenario **MULTI\_HELO** tests the Receiver-SMTP IUT's ability to correctly process multiple HELO commands. This is a very basic capability, so if the IUT does not produce good results on the first run of this test scenario, further testing should be abandoned until the problems are corrected.

**TEST 2: MULTIPLE HELO COMMANDS DURING TRANSACTION**

Does the IUT correctly process multiple HELO commands?

**ACTION:** The CD establishes a connection with the IUT. Multiple HELO commands are issued, followed by a QUIT command.

**VERIFICATION:** The CD searches for the correct command replies.

**SUCCESS:** The CD receives a command reply of 250 for each HELO command.

**FAILURE:** Any of the following indicates an IUT failure:

- Command replies of 500, 501, 504, or 421;
- Command replies other than those listed above;
- Connection not made;
- RD does not correctly perform CD commands.

=====

**Scenario TRANSACTIONS**

Scenario **TRANSACTIONS** tests the Receiver-SMTP IUT's ability to perform a variety of basic SMTP functions. These include basic mail transaction, reverse path and null reverse path processing, undeliverable mail processing, message timestamping, data transparency processing, ability to process all ASCII characters, and NOOP command processing. If the IUT does not produce good results on the first run of this test scenario (particularly Test 3), further testing should be abandoned until the problems are corrected.

**TEST 3: BASIC MAIL TRANSACTION**

Does the IUT correctly receive a mail message and store it in its mail queue?

**ACTION:** The CD establishes a connection with the IUT. The CD conducts a basic mail transaction (HELO, MAIL, RCPT, DATA, QUIT) sending a message containing a unique message identification number. The LD reads the IUT replies and sends them to the CD in a Test Scenario Language (TSL) data packet. The RD reads the IUT mail queue and sends back the mail message to the CD in a TSL data packet.

VERIFICATION: The CD searches the contents of the TSL data packet for the correct command replies and message identification (id) number.

SUCCESS: The correct command replies and message id are found.

FAILURE: Any of the following indicates an IUT failure:

- Connection not made;
- Incorrect command replies received;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

#### **TEST 4: REVERSE-PATH**

Does the IUT prepend the reverse-path to incoming messages?

ACTION: The CD establishes a connection with the IUT. The CD completes a mail transaction (HELO, MAIL, RCPT, DATA, and QUIT). The CD then commands the IUT to spool the message.

VERIFICATION: The CD searches for the correct command reply codes and the correct reverse-path name in the mail message.

SUCCESS: The CD receives successful command replies and the correct reverse-path name is prepended to the message.

FAILURE: Any of the following indicates an IUT failure:

- Connection not made;
- Command reply errors;
- Reverse-path name wrong or nonexistent;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

#### **TEST 5: PREVENTION OF ERROR LOOPS (NULL REVERSE-PATH)**

Does the IUT accept null reverse-paths? .

ACTION: The CD establishes a connection with the IUT. The CD issues the HELO command, then MAIL commands with null reverse-paths. The mail transaction is completed as normal. The CD then commands the IUT to spool the mail message.

VERIFICATION: The CD searches for the correct command reply codes and the correct reverse-path name in the mail message.

**SUCCESS:** The CD receives successful command replies and the correct null reverse-path name (FROM: <>) is prepended to the message.

**FAILURE:** Any of the following indicates an IUT failure:

- Connection not made;
- Command reply errors;
- Null reverse-path wrong or nonexistent;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

#### **TEST 6: UNDELIVERABLE MAIL**

Does the IUT correctly process mail addressed to a nonexistent user?

**ACTION:** The CD establishes a connection with the IUT. The HELO and MAIL commands are sent. Then the CD issues the RCPT command with a nonexistent user (ZZZ\_NO\_SUCH\_dude) followed by a RCPT command with a valid user name.

**VERIFICATION:** The CD searches for the correct command reply codes and the correct message identification number in the mail message.

**SUCCESS:** The CD receives the correct error reply code of 550 to the RCPT command with the nonexistent user and the correct message identification number is received for the valid message.

**FAILURE:** Any of the following indicates an IUT failure:

- Connection not made;
- Command replies other than those listed above;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

#### **TEST 7: MESSAGE TIMESTAMP**

Does the IUT affix a timestamp to the beginning of the mail message.

**ACTION:** The CD establishes a connection with the IUT. The CD completes a normal mail transaction. The CD commands the RD to spool the mail queue.

**VERIFICATION:** The CD searches for the correct command reply codes and the timestamp in the mail message.



**SUCCESS:** The CD receives successful command replies and the correct timestamp is prepended to the message.

**FAILURE:** Any of the following indicates an IUT failure:

- Connection not made;
- Command reply errors;
- Timestamp wrong or nonexistent;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

### **TEST 8: DATA TRANSPARENCY SEQUENCE**

Does the IUT correctly process the data transparency sequence?

**ACTION:** The CD establishes a connection with the IUT. The CD initiates a normal mail transaction. The mail message data contains an embedded end-of-data sequence followed by a known identification number or string.

**VERIFICATION:** The CD searches for the correct command reply codes and the correct message identification string.

**SUCCESS:** The CD receives the correct command reply codes and the correct message identification number or string.

**FAILURE:** Any of the following indicates an IUT failure:

- Connection not made;
- Incorrect reply codes received;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

### **TEST 9: ASCII DATA**

Does the IUT correctly process the printable ASCII characters as mail data?

**ACTION:** The CD establishes a connection with the IUT. The CD initiates a normal mail transaction. The CD sends all the printable ASCII characters as mail data along with a message identification number. The CD completes the transaction normally.

**VERIFICATION:** The CD searches for the correct command replies, the ASCII characters in the mail message, and the correct message identification number.

**SUCCESS:** The CD receives the correct command replies, the ASCII characters, and the correct message identification number.

FAILURE: Any of the following indicates an IUT failure:

- Connection not made;
- Command error replies received;
- Not all ASCII characters received correctly;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

#### **TEST 10: NOOP COMMAND OUTSIDE TRANSACTION**

Does the IUT correctly process the NOOP command outside of a mail transaction?

ACTION: The CD establishes a connection with the IUT. The HELO command is issued, followed by the NOOP command and the QUIT command.

VERIFICATION: The CD searches for the correct command replies.

SUCCESS: The CD receives a command reply of 250 for the NOOP command.

FAILURE: Any of the following indicates an IUT failure:

- Connection not made;
- Command replies of 500, 421;
- Command reply other than those listed above;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

#### **TEST 11: NOOP COMMAND DURING TRANSACTION**

Does the IUT correctly process the NOOP command during a mail transaction?

ACTION: The CD establishes a connection with the IUT. The HELO command is issued, followed by the MAIL and NOOP commands. The RCPT command is then issued followed by another NOOP command. The CD completes the transaction and closes the connection.

VERIFICATION: The CD searches for the correct command replies.

SUCCESS: The CD receives a command reply of 250 for the NOOP command and the mail message was sent correctly.

FAILURE: Any of the following indicates an IUT failure:

- Connection not made;
- Command replies of 500, 421;
- Command reply other than those listed above;

- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

=====

### Scenario LIMITS

Scenario **LIMITS** tests the Receiver-SMTP IUT's ability to correctly process command lines and text lines whose lengths are beyond the MIL-STD limits.

#### TEST 13: EXCESSIVELY LONG COMMAND LINE

Does the IUT correctly process an excessively long command line?

**ACTION:** The CD establishes a connection with the IUT. The CD initiates a normal mail transaction. The CD sends a command line exceeding 512 bytes in length.

**VERIFICATION:** The CD searches for the correct command error reply and the correct message id number.

**SUCCESS:** The CD receives the correct command error reply of either 500 or 501 and the correct message id number.

**FAILURL:** Any of the following indicates an IUT failure:

- Connection not made;
- Successful command reply received;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

#### TEST 14: EXCESSIVELY LONG TEXT LINE

Does the IUT correctly process text lines exceeding 1000 bytes in length?

**ACTION:** The CD establishes a connection with the IUT. The CD initiates a normal mail transaction. The CD sends a text line exceeding 1000 bytes in length.

**VERIFICATION:** The CD searches for the correct command error reply and the correct message id number.

**SUCCESS:** The CD receives the correct command error reply of either 500 or 501 and the correct message id number.

FAILURE: Any of the following indicates an IUT failure:

- Connection not made;
- Successful command reply received;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

=====

### Scenario NEG

Scenario **NEG** tests the Receiver-SMTP IUT's ability to properly reject invalid command sequences, nonexistent commands, and existing commands with incorrect syntax.

#### TEST 16: INVALID SEQUENCE OF COMMANDS

Does the IUT correctly process an invalid sequence of commands?

ACTION: The CD establishes a connection with the IUT. The HELO command is issued, followed by the RCPT command. The IUT should send an error reply to the untimely RCPT command. Then the MAIL is issued, followed by the DATA command. The IUT should issue an error reply to the untimely DATA command. Finally a valid sequence of commands is issued.

VERIFICATION: The CD searches for the correct error replies, command replies and message id number.

SUCCESS: The CD receives error replies of 503 for invalid sequences, command replies of 250 for valid sequences, and the correct message id number.

FAILURE: Any of the following indicates an IUT failure:

- Connection not made;
- Successful command replies received when error replies are expected, and vice versa;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

#### TEST 17: INVALID COMMAND SYNTAX (NONEXISTENT COMMAND)

Does the IUT correctly process nonexistent commands?

ACTION: The CD establishes a connection with the IUT. The HELO command is issued followed by MAIL and RCPT commands with correct syntax. The IUT should reply positively.

The CD then issues a nonexistent command. The IUT should reply negatively. The CD then correctly completes the mail transaction and closes the connection.

VERIFICATION: The CD searches for the correct command replies.

SUCCESS: The CD receives error replies of 500 for incorrect syntaxes, command replies of 250 for correct syntaxes, and the correct message id number.

FAILURE: Any of the following indicates an IUT failure:

- Connection not made;
- Successful command replies received when error replies are expected, and vice versa;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

#### **TEST 18: INVALID COMMAND SYNTAX**

Does the IUT correctly process commands with incorrect syntax?

ACTION: The CD establishes a connection with the IUT. The HELO command is issued followed by a MAIL command with incorrect syntax. The IUT should reply negatively. The CD then issues a MAIL command with correct syntax. The CD then issues a RCPT command with incorrect syntax. The IUT should reply negatively. The CD then issues a RCPT command with correct syntax. The CD completes the mail transaction and closes the connection.

VERIFICATION: The CD searches for the correct command replies.

SUCCESS: The CD receives error replies of 500 for incorrect syntaxes, command replies of 250 for correct syntaxes, and the correct message id number.

FAILURE: Any of the following indicates an IUT failure:

- Connection not made;
- Successful command replies received when error replies are expected, and vice versa;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

=====

**Scenario RELAY**

Scenario **RELAY** tests the Receiver-SMTP IUT's ability to provide message relaying services, if it offers such services. Relaying is tested for a single message, for multiple messages to multiple recipients, and for undeliverable mail requiring relay.

**TEST 20: MESSAGE RELAYING**

Does the IUT correctly relay messages?

**ACTION:** The CD establishes a connection with the IUT. The CD issues the HELO and MAIL commands. The RCPT command is issued with a pathname containing a relay. The destination mailbox is the "test" account.

**VERIFICATION:** The CD searches for the correct command reply and the correct message id number.

**SUCCESS:** The CD receives a command reply of 250 for the RCPT command with the relay pathname.

**FAILURE:** Any of the following indicates an IUT failure:

- Connection not made;
- RCPT command success reply of 251, since the user "test" should be local;
- RCPT command failure reply of 550, 551, 552, 553, 450, 451, 452;
- RCPT command error reply of 500, 501, 503, 421;
- Command reply other than those listed above;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

**TEST 21: MULTIPLE MESSAGE RELAYING**

Does the IUT correctly relay multiple messages to multiple recipients?

**ACTION:** The CD establishes a connection with the IUT. The CD issues the HELO and MAIL commands. The RCPT command is issued three times with a pathname containing a relay. The destination mailboxes are the "test", "test2", "test3" accounts.

**VERIFICATION:** The CD searches for the correct command replies and the correct message id number.

**SUCCESS:** The CD receives a command reply of 250 for the RCPT commands with relay pathnames.

**FAILURE:** Any of the following indicates an IUT failure:

- Connection not made;
- RCPT command success reply of 251, since the user "test", "test2", and "test3" should be local;
- RCPT command failure reply of 550, 551, 552, 553, 450, 451, 452;
- RCPT command error reply of 500, 501, 503, 421;
- Command reply other than those listed above;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

## **TEST 22: UNDELIVERABLE MESSAGES REQUIRING RELAY**

Does the IUT correctly notify the sender of undeliverable messages requiring relay?

**ACTION:** The CD establishes a connection with the IUT. The CD issues the HELO and MAIL commands. The RCPT command is issued with a pathname containing a nonexistent username. The destination mailbox is a fictitious account.

**VERIFICATION:** The CD searches for the correct command error reply.

**SUCCESS:** The CD receives a command failure reply of 550 for the RCPT command with the nonexistent username.

**FAILURE:** Any of the following indicates an IUT failure:

- Connection not made;
- RCPT command success reply of 250, 251;
- RCPT command failure reply of 551, 552, 553, 450, 451, 452;
- RCPT command error reply of 500, 501, 503, 421;
- Command reply other than those listed above;
- RD does not correctly perform CD commands;

=====

## **Scenario RSET**

Scenario **RSET** tests the Receiver-SMTP IUT's ability to correctly process the RSET command during a transaction.

**TEST 23: RSET COMMAND DURING A TRANSACTION**

Does the IUT correctly process the RSET command during a transaction?

**ACTION:** The CD establishes a connection with the IUT. The CD starts a mail transaction by issuing the HELO and MAIL commands. Then the RSET command is issued and the transaction is resumed.

**VERIFICATION:** The CD searches for the correct command replies.

**SUCCESS:** The CD receives a command reply of 250 for the RSET command and the IUT is able to complete the mail transaction.

**FAILURE:** Any of the following indicates an IUT failure:

- Command replies of 500, 501, 504, 421;
- Command replies other than those listed above;
- Connection not made;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

=====

**Scenario RSET RCPT**

Scenario **RSET\_RCPT** tests the Receiver-SMTP IUT's ability to correctly process the RSET command after a RCPT command has been issued.

**TEST 24: RSET COMMAND AFTER RCPT**

Does the IUT correctly process the RSET command after a RCPT command?

**ACTION:** The CD establishes a connection with the IUT. The CD starts a mail transaction by issuing the HELO, MAIL, and RCPT commands. Then the RSET command is issued and the transaction is resumed.

**VERIFICATION:** The CD searches for the correct command replies.

**SUCCESS:** The CD receives a command reply of 250 for the RCPT command and the IUT is able to complete the mail transaction.



FAILURE: Any of the following indicates an IUT failure:

- Command replies of 500, 501, 504, 421;
- Command replies other than those listed above;
- Connection not made;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

=====

### Scenario RSET SAML

Scenario **RSET\_SAML** tests the Receiver-SMTP IUT's ability to correctly process the RSET command during a SAML transaction.

#### TEST 25: RSET COMMAND DURING A SAML TRANSACTION

Does the IUT correctly process the RSET command during a SAML transaction?

ACTION: The CD establishes a connection with the IUT. The CD starts a send and mail transaction by issuing the HELO and SAML commands. Then the RSET command is issued and the transaction is resumed.

VERIFICATION: The CD searches for the correct command replies.

SUCCESS: The CD receives a command reply of 250 for the RSET command and the IUT is able to complete the mail transaction.

FAILURE: Any of the following indicates an IUT failure:

- Command replies of 500, 501, 504, 421;
- Command replies other than those listed above;
- Connection not made;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

=====

### Scenario RSET SOML

Scenario **RSET SOML** tests the Receiver-SMTP IUT's ability to correctly process the RSET command during a SOML transaction.

**TEST 26: RSET COMMAND DURING A SOML TRANSACTION**

Does the IUT correctly process the RSET command during a SOML transaction?

**ACTION:** The CD establishes a connection with the IUT. The CD starts a send or mail transaction by issuing the HELO and SOML commands. Then the RSET command is issued and the transaction is resumed.

**VERIFICATION:** The CD searches for the correct command replies.

**SUCCESS:** The CD receives a command reply of 250 for the RSET command and the IUT is able to complete the mail transaction.

**FAILURE:** Any of the following indicates an IUT failure:

- Command replies of 500, 501, 504, 421;
- Command replies other than those listed above;
- Connection not made;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

=====

**Scenario SEND**

Scenario **SEND** tests the Receiver-SMTP IUT's ability to process the various SEND-related commands during basic SMTP transactions. The SEND, SOML, and SAML commands are tested without corruption, and the SEND command is also tested with an undeliverable message.

**TEST 27: SEND TRANSACTION**

Does the IUT correctly process the SEND command?

**ACTION:** The CD establishes a connection with the IUT. The CD issues the SEND command with a known message identification number. The message is displayed on the destination terminal screen.

**VERIFICATION:** The CD searches for the correct command reply. Manual verification of correct message receipt is done at the destination terminal. Also, no mail message should have been spooled onto IUT mail queue.

**SUCCESS:** The CD receives a command reply of 250, a manual verification of message receipt, and no mail message is found on IUT mail queue.

**FAILURE:** Any of the following indicates an IUT failure:

- Command failure reply of 552, 451, 452;
- Command error reply of 500, 501, 502, 421;
- Mail message found on IUT mail queue;
- Connection not made;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

**TEST 28: SEND COMMAND WITH AN UNDELIVERABLE ADDRESS**

Does the IUT correctly process an undeliverable message sent via the SEND command?

**ACTION:** The CD establishes a connection with the IUT. The CD commands the LD to send a message to a nonexistent user.

**VERIFICATION:** The CD searches for the correct error reply to the RCPT command (the RCPT command is used in conjunction with the SEND command).

**SUCCESS:** The CD receives an error reply of 550 or 421.

**FAILURE:** Any of the following indicates an IUT failure:

- Command success reply of 250, 251;
- Command error reply of 500, 501, 503;
- Command failure reply of 551, 552, 553, 450, 451, 452;
- Connection not made;
- RD does not correctly perform CD commands;

**TEST 29: SOML TRANSACTION**

Does the IUT correctly process the SOML command?

**ACTION:** The CD establishes a connection with the IUT. The CD commands the LD to issue the SOML command with a known message identification number. The message is either displayed on the destination terminal screen or placed onto the IUT mail queue, but not both.

**VERIFICATION:** The CD searches for the correct command reply and, if the message was not placed onto the IUT mail queue, receives manual verification of correct message receipt at destination terminal. Also, no mail message should have been placed onto the IUT mail queue if the message was displayed at the destination terminal.

**SUCCESS:** The CD receives a command reply of 250. Manual verification of message receipt is done at the destination terminal, and no mail message is found on IUT mail queue; or, a 250 reply with no message received at the destination terminal, but a correct message placed onto the IUT mail queue.

**FAILURE:** Any of the following indicates an IUT failure:

- Command failure reply of 552, 451, 452;
- Command error reply of 500, 501, 502, 421;
- Connection not made;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

### **TEST 30: SAML TRANSACTION**

Does the IUT correctly process the SAML command?

**ACTION:** The CD establishes a connection with the IUT. The CD commands the LD to issue the SAML command with a known message identification number. The message is displayed on the destination terminal screen and placed onto the IUT mail queue.

**VERIFICATION:** The CD searches for the correct command reply and receives manual verification of correct message receipt at the destination terminal. The mail message should have been placed onto the IUT mail queue and the message displayed at the destination terminal.

**SUCCESS:** The CD receives a command reply of 250, a manual verification of correct message receipt at destination terminal, and the mail message is found on the IUT mail queue.

**FAILURE:** Any of the following indicates an IUT failure:

- Command failure reply of 552, 451, 452;
- Command error reply of 500, 501, 502, 421;
- Connection not made;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

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### **Scenario TURN**

Scenario **TURN** tests the Receiver-SMTP IUT's ability to correctly process the TURN command and function as a Sender-SMTP. The scenario begins by testing the IUT in its Receiver-SMTP mode. If

the TURN command is implemented and accepted, the scenario tests the IUT in its Sender-SMTP mode.

### **TEST 32: TURN COMMAND**

Does the IUT successfully process the TURN command?

**ACTION:** The CD establishes a connection with the IUT. The HELO command is issued, followed by the TURN command. If the TURN command is accepted by the IUT, then the IUT is tested as a Sender-SMTP. The CD commands the RD to queue a mail message with a known identification number onto the IUT mail queue. The SMTP connection is then closed and the CD commands the Reference SMTP to listen for a connection attempt from the IUT. The mail transaction is then tested as normal.

**VERIFICATION:** The CD searches for the correct command replies and the correct mail message identification number.

**SUCCESS:** The CD receives a command reply of 250 and the correct message identification number, or the CD receives the command reply 502 indicating "Command not implemented."

**FAILURE:** Any of the following indicates an IUT failure:

- Connection not made;
- Command replies of 500, 503;
- Command reply other than those listed above;
- RD does not correctly perform CD commands;

=====

### **Scenario OPTIONS**

Scenario **OPTIONS** tests the Receiver-SMTP IUT's ability to correctly process the optional VRFY, EXPN, and HELP commands, both inside and outside of a transaction.

### **TEST 33: VRFY COMMAND OUTSIDE A TRANSACTION**

Does the IUT correctly process the VRFY command outside a transaction?

**ACTION:** The CD establishes a connection with the IUT. The CD issues the HELO command followed by the VRFY command. The user input iut username is used as the parameter to the VRFY command. The remote site must have an account with the correct username for the test to succeed.

VERIFICATION: The CD searches for the correct command replies.

SUCCESS: The CD receives a command reply of 250 or 251 for the VRFY command.

FAILURE: Any of the following indicates an IUT failure:

- Connection not made;
- Command reply of 500, 501, 502, 421, 550.
- Command reply other than those listed above;
- RD does not correctly perform CD commands;

#### **TEST 34: EXPN COMMAND OUTSIDE A TRANSACTION**

Does the IUT correctly process the EXPN command outside a transaction?

ACTION: The CD establishes a connection with the IUT. The CD issues the HELO command followed by the EXPN command. The groupname "test\_group" is used as the parameter to the EXPN command. The remote site must have a group with groupname "test\_group" composed at least of users "test", "test2", and "test3", with "test3" being last in order, for the test to succeed.

VERIFICATION: The CD searches for the correct command replies.

SUCCESS: The CD receives a command reply of 250 for the EXPN command.

FAILURE: Any of the following indicates an IUT failure:

- Connection not made;
- Command reply of 500, 501, 502, 421, 550;
- Command reply other than those listed above;
- RD does not correctly perform CD commands;

#### **TEST 35: HELP COMMAND OUTSIDE A TRANSACTION**

Does the IUT correctly process the HELP command outside a transaction?

ACTION: The CD establishes a connection with the IUT. The CD issues the HELO command, immediately followed by the HELP command.

VERIFICATION: The CD searches for the correct command replies.

SUCCESS: The CD receives a command reply of 211 or 214 for the HELP command.

**FAILURE:** Any of the following indicates an IUT failure:

- Connection not made;
- Command replies of 500, 501, 502, 504, 421;
- Command reply other than those listed above;
- RD does not correctly perform CD commands;

### **TEST 36: VRFY COMMAND DURING A TRANSACTION**

Does the IUT correctly process the VRFY command during a transaction?

**ACTION:** The CD establishes a connection with the IUT. The CD issues the HELO and MAIL commands followed by the VRFY command, and then the RCPT command followed by the VRFY command. The input iut username is used as the parameter to the VRFY command. The remote site must have an account with the correct username for the test to succeed.

**VERIFICATION:** The CD searches for the correct command replies.

**SUCCESS:** The CD receives a command reply of 250 or 251 for the VRFY command.

**FAILURE:** Any of the following indicates an IUT failure:

- Connection not made;
- Command reply of 500, 501, 502, 421, 550, 551, 553;
- Command reply other than those listed above;
- RD does not correctly perform CD commands;

### **TEST 37: EXPN COMMAND DURING A TRANSACTION**

Does the IUT correctly process the EXPN command during a transaction?

**ACTION:** The CD establishes a connection with the IUT. The CD issues the HELO and MAIL commands followed by the EXPN command, and then the RCPT command followed by the EXPN command. The groupname "test\_group" is used as the parameter to the EXPN command. The remote site must have a group with groupname "test\_group" composed at least of of users "test", "test2", "test3", with "test3" being last in order, for the test to succeed.

**VERIFICATION:** The CD searches for the correct command replies.

**SUCCESS:** The CD receives a command reply of 250 for the EXPN command.

FAILURE: Any of the following indicates an IUT failure:

- Connection not made;
- Command reply of 500, 501, 502, 421, 550.
- Command reply other than those listed above;
- RD does not correctly perform CD commands;

### **TEST 38: HELP COMMAND DURING A TRANSACTION**

Does the IUT correctly process the HELP command during a transaction?

ACTION: The CD establishes a connection with the IUT. The CD issues the HELO and MAIL commands, followed by the HELP command. Then the RCPT command is issued followed by the HELP command.

VERIFICATION: The CD searches for the correct command replies.

SUCCESS: The CD receives a command reply of 211 or 214 for the HELP command.

FAILURE: Any of the following indicates an IUT failure:

- Connection not made;
- Command replies of 500, 501, 502, 504, 421;
- Command reply other than those listed above;
- RD does not correctly perform CD commands;

=====

### **Scenario HOSTNAMES**

Scenario **HOSTNAMES** tests the Receiver-SMTP IUT's ability to correctly process hostnames in all valid domain formats.

### **TEST 40: HOSTNAME FORMATS**

Does the IUT correctly process all valid hostname formats?

ACTION: The CD establishes a connection with the IUT. Mail is sent to the IUT with different hostname formats.

VERIFICATION: The CD searches for the correct command replies and message id number.

SUCCESS: The CD receives a command reply of 250 for all RCPT commands using valid hostname formats.



FAILURE: Any of the following indicates an IUT failure:

- Connection not made;
- RCPT command failure reply of 550, 551, 552, 553, 450, 451, 452;
- RCPT command error reply of 500, 501, 503, 421;
- Command reply other than those listed above;
- RD does not correctly perform CD commands;
- Message id is wrong or nonexistent.

=====

### Scenario MULTI RCPT

Scenario **MULTI\_RCPT** tests the Receiver-SMTP IUT's ability to process multiple RCPT commands during a mail transaction.

#### TEST 41: MULTIPLE RCPT COMMANDS DURING A TRANSACTION

Does the IUT correctly process multiple recipients?

ACTION: The CD establishes a connection with the IUT. The CD first sends the HELO and MAIL commands. Then the CD sends multiple RCPT commands.

VERIFICATION: The CD searches for the correct command replies. The CD also checks the mail queue for multiple mail messages. All messages should be received with the correct message id number.

SUCCESS: CD receives a command reply of 250 or 251, and all messages are received with the correct message id.

FAILURE: Any of the following indicates an IUT failure:

- Command error reply of 500, 501, 503, 421;
- Command failure reply of 550, 551, 552, 553, 450, 451, 452;
- Connection not made;
- RD does not correctly perform CD commands;
- A message id is wrong or nonexistent.

=====

### Scenario MULTI SMTP

Scenario **MULTI\_SMTP** tests the Receiver-SMTP IUT's ability to process two or more simultaneous SMTP transactions. This scenario requires multiple Lab Drivers.

**TEST 42: MULTIPLE, SIMULTANEOUS SMTP TRANSACTIONS**

Does the IUT correctly process multiple, simultaneous SMTP transactions?

**ACTION:** The CD establishes multiple connections with the IUT. The CD executes a normal mail transaction for each connection.

**VERIFICATION:** The CD searches for the correct command replies and correct message id numbers for each connection.

**SUCCESS:** The CD receives the correct command replies and correct message id numbers for each connection.

**FAILURE:** Any of the following indicates an IUT failure:

- Any of the connections not made;
- RD does not correctly perform CD commands;
- Any message id is wrong or nonexistent.

=====

**Scenario RELAY3**

Scenario **RELAY3** tests the Receiver-SMTP IUT's ability to relay mail messages through multiple hosts if the service is offered.

**TEST 43: MESSAGE RELAYING THROUGH MULTIPLE HOSTS**

Does the IUT correctly relay messages through multiple hosts?

**ACTION:** The CD establishes a connection with the IUT. The CD issues the HELO and MAIL commands. The RCPT command is issued with a pathname containing a relay through multiple hosts. The destination mailbox is the "test" account.

**VERIFICATION:** The CD searches for the correct command reply.

**SUCCESS:** The CD receives a command reply of 250 for the RCPT command with the relay pathname.

**FAILURE:** Any of the following indicates an IUT failure:

- Connection not made;
- RCPT command success reply of 251, since the user "test" should be local;
- RCPT command failure reply of 550, 551, 552, 553,

- 450, 451, 452;
- RCPT command error reply of 500, 501, 503, or 421;
  - Command reply other than those listed above;
  - RD does not correctly perform CD commands;
  - Message id is wrong or nonexistent.